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THE KENT COUNTY, MICH., UPLAND PLANT SOCIETIES.

It was with much interest that I read Mr. Livingston's contribution in the January, 1903, number of the *Botanical Gazette* upon the 'Distribution of the upland plant societies of Kent County, Mich.' I confess also to no little disappointment. My home is in Kent County, and several years of ecological study there have yielded me results that do not in all respects coincide with those contained in the article under review. I have not seen the author's more detailed account in the 'Report' of the Michigan Geological Survey for 1901, and perhaps some things that here seem obscure may there be made clear. In the first place Mr. Livingston's results appear to be based upon insufficient observation. The region chosen is too large, the flora too rich and complex, to allow of a thorough study in a single season. This manner of research, useful as it is in securing valuable data, is manifestly defective. Plant societies are not so simple as they appear at first sight. Subtle changes in soil, exposure and water-supply lead to corresponding changes in plant formations. A society in one region may appear distinct, while in reality it is but one phase of a larger society. Only a patient study of years of a local flora throughout all the seasons is of much worth, for only thus can a comprehensive and intelligent view of the prevalent conditions of plant life, as well as the character and actual constituents of the flora, be obtained.

Mr. Livingston has five primary plant societies: (1) The beech-maple, (2) the maple-elm-agrimony, (3) the oak-hickory, (4) the oak-hazel and (5) the oak-pine-sassafras societies. These seem hardly natural. The first two are very much nearer one another than the following three, and the third and fourth have a more intimate connection with each other than either has with the fifth.

Setting aside the strictly lowland societies, the sylvan element of the Kent County flora may well fall into four main types:

I. The elm-soft maple society of the river bottoms and other alluvial flats. *Ulmus*

americana, *Acer dasycarpum* and *rubrum*, *Juglans cinerea*, *Platanus occidentalis*, *Salix nigra* and various other trees are present. Mr. Livingston has probably excluded much of this element because of its hydrophytic affinities, though his maple-elm-agrimony society corresponds to it in part. We may call this the bottoms-flora.

II. The beech-maple-basswood society of the timberlands. *Acer saccharum* and *nigrum*, *Fagus ferruginea*, *Tilia Americana*, *Fraxinus Americana* and *sambucifolia*, *Ulmus Americana* and several other trees are present. It has an herbaceous flora strictly its own. The soil is black and rich, and relatively moist. This includes Mr. Livingston's first and the greater part of his second society.

III. The oak-hickory-sassafras society of the oak-openings, having a great range of soils, being found in swamps, rich plains and valleys, as well as barren sands and clay hills. *Quercus bicolor* and *rubra* clothe the margins of swamps. *Quercus macrocarpa* and *Muhlenbergii* prefer the heavier clays, thus forming the bur-oak openings. *Quercus alba*, accompanied by the various black oaks, prefers the ordinary midland soils, though it is present throughout the entire range of the genus. *Quercus coccinea*, *velutina* and *imbricaria* prefer the drier soils, and with them is *rubra* (often) and *stellata* (rarely). The species of hickory show a like preference of soil. The flowering dogwood and the sassafras are also quite peculiar to the oak openings. In regions adjoining the timberlands the two floras merge somewhat into one another, though the oak flora is usually ascendant. In these forests, known as timberland openings, a rich fertile soil is present, perhaps the best of all our soils for agricultural purposes. Oaks are very rare in the true timberlands, but when present are usually of colossal size. Only *Quercus rubra* is at all frequent. Of hickories only *Carya amara* is common in the timberlands. *Juglans nigra* and *Prunus serotina* occur both in the timberlands and in the oak openings, but are now scarce except as shade trees in fields.

IV. The pine-hemlock-canoe-birch society of

the pine woods. This, as Mr. Livingston justly remarks, has disappeared in most places and has been supplanted by the flora of the lighter, drier oak openings. Only remnants of the true coniferous flora still remain, but *Epigæa repens*, *Gaultheria procumbens*, *Myrica asplenifolia* and the upland huckleberries and blueberries are still of occasional, or indeed locally of frequent, occurrence.

Of strictly mesophytic forest types we have then three, that of the beech and maple timberlands, that of the oak openings, and that of the pine woods. Of these the last is disappearing, and its remnants have, save in a few tracts of still standing pine, coalesced with the flora of the oak openings. In addition to the above, small tracts of almost pure birch are occasional, and in forests that have suffered most from fires a salicaceous type is often developed, consisting of various willows and our two aspen-poplars. Hawthorn glades, too, are of frequent occurrence, consisting mainly of species of *Cratægus*, *Pyrus coronaria* and various other shrubs.

Turning our attention now to details, we may well distrust the value of using common weeds, such as catnip, pokeweed, nightshade, spurge and even sand-burs as typical plants of native sylvan societies. These are plants capable of wide range of soils and conditions. They were not weeds else. Doubtless our common stick-tight (*Bidens frondosa*) is a hydrophyte, yet hardly is there any field where it is not too common. The sand-bur with us, is a straggler from the sands of the Great Lakes, and is hardly indigenous except along our rivers. Now it is along all paths, roadsides and railroads. The common nightshade is a cosmopolite, and frequent everywhere.

As to the spurge, which is narrow-leaved or wide-leaved according to the society in which it grows, probably *Euphorbia corollata* is meant. I think that the width of the leaves varies with the age of the plants. In early summer, before the plant has branched, the cauline leaves are broad, but the later leaves, especially those on the branches, are much narrower. Nevertheless, the soil has also an influence on the robustness of this spurge, as it has on most species.

Dracocephalum parviflorum is given in the table as a frequent and characteristic plant of the beech-maple society. This plant I have never seen, and in the 'Flora of Michigan' published in the report of the Michigan Board of Agriculture for 1891, but three stations are given of this rare plant in the Lower Peninsula—Houghton Lake, Alcona County and Hubbardston. Perhaps it is locally abundant in portions of Kent County, and Mr. Livingston will oblige all students of the Michigan flora, if he will name exact localities.

Quercus ilicifolia similarly is given in the list as a frequent and characteristic plant of the oak-pine-sassafras society. It has not, to my knowledge, ever been reported before from any place in Michigan. According to all the manuals this oak is restricted to the Atlantic and Appalachian regions, not occurring west of portions of Ohio. It is hard to determine what oak has been confused with this strictly eastern species. The shingle oak, *Quercus imbricaria*, I have not seen north of the lower tier of counties in Michigan, though it is said to grow at Ann Arbor. The black jack, *Quercus marilandica*, is not known to occur certainly in Michigan, though it is mentioned in old lists as occurring in the extreme south. The species intended by *Quercus ilicifolia* is doubtless *Quercus coccinea*, or its variety *tinctoria*, in some of its scraggly dwarf forms.

The term *Quercus rubra coccinea* is neither exact nor scientific, as the two species are very easily separated by the mature fruit as well as by the buds. Only by those who judge the trees by the foliage at a distance are the two likely to be confused. Though they occasionally grow together, the red oak is oftener found at the margins of swamps and more rarely in the lighter soils. It, too, is occasional in the timberland forests. If the oak forest is to be divided as sharply as Mr. Livingston has divided it, the two must be separated.

The herbs given by Mr. Livingston as characteristic of the several plant societies are nearly all of the midsummer vegetation; his studies of the region quite likely took place then. Perhaps even better types could be chosen from the vernal species. Then, too,

the grasses and sedges appear not to have been studied at all, though these, next to the trees and shrubs, are the most important ecologically in most temperate regions. These omissions as well as the failure to distinguish sharply between related species—thus *Vitis cordifolia*, which is not known certainly to occur in Michigan, is confused with the very common *Vitis riparia*—and the failure also to discriminate between primary and secondary plant societies, detract seriously from the worth of Mr. Livingston's paper. The excellence of his treatment of the soils and the geological factors of the flora is thus marred somewhat by hurried and inexact observation of the flora itself. The ecologist must know his plants, or his work is worthless. He can not neglect any great group, not even the lower cryptogams, and give us a true conception of the actual plant life. He must stay with his flora till he knows it—he must see, if possible, the relation of each species with its environment, its relation too with its neighbor. If he can not cover a state or a county, let him be content with a township or a section. A broad plant survey has its uses; it has also its defects, but even so, such a survey should spring out of an intimate knowledge of local floras. A generalization not drawn from verified particulars is of no use to exact science.

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July 2, 1903.

DISCOVERY OF THE BREEDING AREA OF KIRTLAND'S
WARBLER IN MICHIGAN.

ABOUT a month ago Mr. E. H. Frothingham, an assistant in this museum, and his friend, Mr. T. G. Gale, took an outing in Oscoda County, Michigan, and went prepared to secure specimens for the museum. On their return it was found that a male specimen of Kirtland's warbler (*Dendroica kirtlandi*) was among the bird skins which they had secured. This is one of the rarest and most interesting of North American birds, less than thirty specimens having been recorded from the United States and Canada. Mr. Frothingham has published a preliminary note of this June

capture of a Kirtland warbler in the *Bulletin of the Michigan Ornithological Club*, Vol. IV. (Detroit). This is the first June record of the capture of this species. The late occurrence of this bird in northern Michigan and its relative abundance (several birds were seen and heard which were not taken) suggested that the bird was breeding in that region. In the hope of settling this point, as the breeding area of this bird was unknown, this museum sent its taxidermist, Mr. N. A. Wood, to Oscoda County to make a thorough investigation of this question and to secure specimens for the museum. Mr. Wood has just returned from this trip and has had excellent success as is shown by his having secured two nests with the young and one egg, thus establishing beyond question the breeding area of this species. A full account of the results of Messrs. Wood and Frothingham will soon be published. From an ornithological standpoint this is a very important discovery. In the *Auk* for October, 1898, Mr. F. M. Chapman writes concerning our knowledge of the North American warblers: "With the exception of several Mexican species just reaching our border, we can now write 'rare; nest and eggs unknown,' only of Kirtland's warbler." It is thus evident that this is a discovery of considerable interest.

Some unauthorized and incorrect reports have been made public, which makes it desirable to make this preliminary statement.

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CURRENT NOTES ON METEOROLOGY.

CLIMATE OF CAIRO.

IN 1859 the Khedive of Egypt ordered the reestablishment of the observatory which had existed at Bulaq from 1845 to 1850, but had then been closed. A site was selected and regular observations were commenced in 1868. The observatory is about three miles northeast of Cairo, on the edge of the desert, close to the military barracks of Abbassia. In 1889 Mr. J. Barois published a very